RAYTHEON

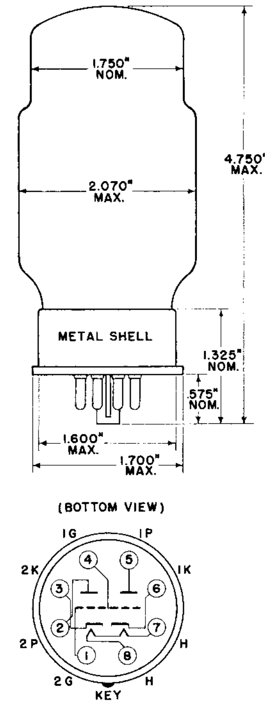
TECHNICAL INFORMATION

TWIN POWER TRIODE

TYPE CK6336A

Excellence in Electronics

The Raytheon CK6336A is a low MU twin power triode used especially in series regulated power supplies. It is mechanically rugged and is designed for long life operation. In operation it is able to handle large currents over a wide voltage range. The anodes are zirconium coated graphite supported by ceramic insulators. The use of large cathodes provides more than sufficient emission current. The grid wires are gold plated molybdenum and the mount is set on a rugged button stem supported by flexible metal vibration snubbers. The use of these elements and the hard glass envelope makes it possible to degas the tube at high temperature during processing, enabling the the tube to be used at high temperatures without the fear of harmful gases which may be given off by tube elements. The Raytheon CK6336A can in some circuits replace 2 or 3 type 6080WA or 6AS7G regulator tubes. Many CK6336A tubes can be paralleled as desired for increased levels of current or power.



MECHANICAL DATA

ENVELOPE: ST-16-Nonex

BASE: Large Wafer Octal With Metal Sleeve, 8-Pin, JEDEC #B8-86

TERMINAL CONNECTIONS:

Pin 1: Grid, Unit #2	Pin 5: Plate, Unit #1
Pin 2: Plate, Unit #2	Pin 6: Cathode, Unit #1
Pin 3: Cathode, Unit #2	Pin 7: Heater
Pin 4: Grid, Unit #1	Pin 8: Heater

MECHANICAL RATINGS:

Maximum Impact Acceleration (Shock Test-Note 2)	720 G
Maximum Bulb Temperature	250 °C

MOUNTING POSITION: Any (Note 5)

ELECTRICAL DATA

CAUTION:---To Electron Equipment Design Engineers: Special attention should be given to the temperature at which the tubes are to be operated. Reliability will be seriously impaired if maximum bulb temperature is exceeded. The life expectancy may be reduced if conditions other than those specified for life test are imposed on the tube and will be reduced appreciably if maximum ratings are exceeded. Both reliability and performance will be jeopardized if filament voltage ratings are exceeded. Life and reliability of performance are closely related to the degree that regulation of the heater voltage is maintained at its center rated value.

RATINGS AND NORMAL OPERATION:	MIL-E-1 SYMBOL	ABSOLUTE MINIMUM	NORMAL TEST CONDITIONS (Note 4)	NORMAL OPERATION (Note 3)	ABSOLUTE MAXIMUM	MIL-E-1 UNITS
Heater Voltage: (Note 7)	Ef:	5.7	6.3	6.3	6.9	V
Plate Voltage:	Eb:	----	190	190	400	Vdc
Grid Voltage:	Ec1:	-300	0	0	----	Vdc
Heater Cathode Voltage:	Ehk:	-300	----	----	+300	Vdc
Cathode Resistance (Per Cathode):	Rk/k:	(Note 6)	200	200	----	ohms
Plate Dissipation (Per Plate):	Pp/p:	----	----	----	30	watts
Grid Resistance (Total):	Rg:	500	500Min.	----	500,000	ohms
Resistance Per Grid Leg When Triode Sections Are Paralleled:	Rg/g:	500	----	----	----	ohms
Transconductance (Per Plate):	Sm/p:	----	----	13,500	----	µmhos
Amplification Factor:	Mu/p:	----	----	2.7	----	----
Grid Current (Per Grid):	Ic1/g:	----	----	----	0	µA
Plate Current (Per Plate):	Ib/p:	----	----	----	400	mAdc
Cathode Conditioning Time:	TK:	(Note 14)	----	----	----	mAdc

Tentative Data

ELECTRICAL DATA (Cont'd)

CHARACTERISTICS AND QUALITY CONTROL (Note 1)

In the following tests each unit is tested separately

TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN	LAL	BOGIE	UAL	MAX	ALD	MIL-E-1 UNITS
MEASUREMENTS ACCEPTANCE TESTS, PART 1			**Combined AQL = 1.0 % excluding Mechanical and Inoperatives**							
Heater Cathode Leakage:	Ehk = +300 Ehk = −300 (Note 10)	0.65 0.65	Ihk: Ihk:	---- ----	---- ----	---- ----	---- ----	40 40	---- ----	µAdc µAdc
Grid Current (1):	Rg/g = 50 K (Note 11)	0.65	Ic1:	----	----	----	----	−4.0	----	µAdc
Plate Current (1):	(Note 8)	0.65	Ib1:	165	----	185	----	200	----	mAdc
Emission:	Eb = 10 Vdc; Ec = 10 Vdc; Rk/k = 0 ohms; (Note 12)	0.65	Is:	150	----	----	----	----	----	mAdc
Plate Current (3):	Eb = 200 Vdc; Ec = −100 Vdc; Rk/k = 0 ohms; (Note 8)	0.65	ΔIb(1):	----	----	----	----	10	----	mAdc
Continuity and Shorts (Inoperatives):		0.4	----	----	----	----	----	----	----	----
Mechanical:	Envelope ST−16−Nonex	----	----	----	----	----	----	----	----	----
MEASUREMENTS ACCEPTANCE TESTS, PART 2										
Insulation of Electrodes:		6.5	Rg-all: Rp-all:	10 10	---- ----	---- ----	---- ----	---- ----	---- ----	Meg Meg
Transconductance (1):	Ck = 1000 µf (Note 8)	6.5	Sm(1):	11,000	----	13,500	----	16,000	----	µmhos
Plate Current (2):	Eb = 40 Vdc; Ec = 0; Rk/k = 0 ohms (Note 8)	6.5	Ib(2):	150	----	----	----	----	----	mAdc
Transconductance (2):	Ef = 5.7 V; Ck = 1000 µf; (Notes 8 & 9)	6.5	Δ_{Ef} Sm(2):	----	----	----	----	15	----	%
Amplification Factor:	(Note 8)	6.5	Mu:	2.0	----	2.7	----	3.4	----	----
Vibration (1):	F = 10−50−10 cps; G = 2.5; Ec/Ib = 75 mAdc; Ck = 1000 µf; Rp = 2000 ohms; Per MIL-E-1 Ref. Par. 4.9.20.3	6.5	Ep:	----	----	----	----	200	----	mVac
Heater Current:	Ef = 6.3 V	6.5	If:	4.75	----	5.0	----	5.25	----	A
DEGRADATION RATE ACCEPTANCE TESTS										
Shock:	Ef = 6.3 V Hammer Angle = 48°; 720 G−1 msec (Note 2)	----	----	----	----	----	----	----	----	----
Post Shock Test End Points:										
Heater Cathode Leakage:	Ehk = +300 Vdc Ehk = −300 Vdc (Note 10)	----	Ihk: Ihk:	---- ----	---- ----	---- ----	---- ----	100 100	---- ----	µAdc µAdc
Grid Current (1):	(Note 11)	----	Ic:	----	----	----	----	−8	----	µAdc
Plate Current (1):	(Note 8)	----	Ib(1):	150	----	----	----	----	----	mAdc
Transconductance (1):	(Note 8)	----	Gm(1):	9000	----	----	----	----	----	µmhos

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ELECTRICAL DATA (Cont'd)

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1)

In the following tests each unit is tested separately

TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN	MAX	MIL-E-1 UNITS	Allowable Defects Per Characteristic 1st Sample	Combined Samples
ACCEPTANCE LIFE TESTS								
1000 Hours Intermittent Life Test:	Ef=6.3 V; Eb=190 Vdc; Ec=0 Vdc; Ehk=300 V; Rg/g=500,000 ohms; Rk/k=200 ohms; T Bulb=250 °C ± 25° C Note 13–15	----	----	----	----	----	----	----
1000 Hour Intermittent Life Test End Points:	(Typical Sample Size=5 Tubes)	----	----	----	----	----	----	----
Inoperatives:		----	----	----	----	----	----	----
Plate Current (1):	(Note 8)	----	Ib:	150	----	mAdc	----	----
Grid Current (1):	(Note 11)	----	Ic1:	0	–8	μAdc	----	----
Transconductance (1):	(Note 8)	----	Sm:	9000	----	μmhos	----	----
Heater Cathode Leakage:	Ehk=+300 Vdc;	----	Ihk:	----	100	μAdc	----	----
	Ehk=–300 Vdc; (Note 10)		Ihk:	----	100	μAdc	----	----

NOTES:

Note 1: Characteristics, Quality Control Test Procedures, and Inspection Levels are made according to the appropriate paragraphs of MIL-E-1. "Inspection Instructions for Electron Tubes," and MIL-STD-105A.

Note 2: Test Conditions and Acceptance Criteria per Shock Test Procedures of MIL-E-1 basic specifications.

Note 3: These normal values represent conditions at which control of reliability may be expected.

Note 4: These normal test conditions are used for all characteristics unless otherwise stated under the individual test item.

Note 5: If the tube is to be mounted in a horizontal position it is recommended that it be mounted so that the base lug key be either directly up or directly down.

Note 6: Minimum cathode resistance per cathode leg shall be 270 ohms or that resistance necessary to provide 10% of the grid bias voltage, which-ever is greater.

Note 7: For most applications the performance will not be adversely affected by ± 10% heater voltage variation, but when the application can provide a closer control of heater voltage, an improvement in reliability will be realized.

Note 8: Voltages are applied to both sections, but each section is tested separately. Values specified herein are for individual sections, expect for heater current. Readings shall be taken after tube has been drawing current at least 5 minutes.

Note 9: Change of transconductance for individual tubes from that value measured at Ef= 6.3 volts to that value measured at Ef= 5.7 V.

Note 10: IK shall be tied to 2K.

Note 11: With both units operating, Ic is sum of I1c and I2c.

Note 12: Each unit shall be read separately. Ground unit not under test.

ELECTRICAL DATA (Cont'd)

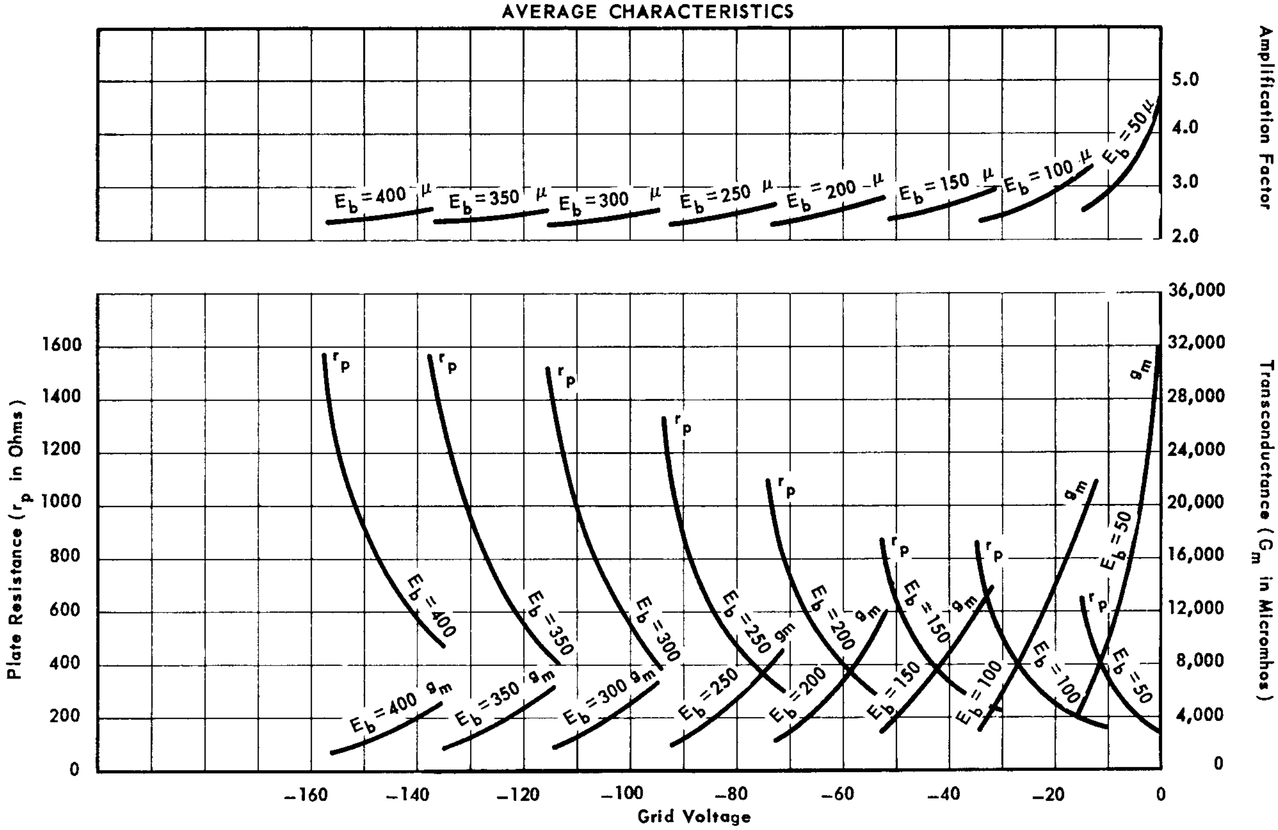
NOTES (Cont'd)

Note 13: The tube shall be cycled 30 seconds heater positive and 30 seconds heater negative.

Note 14: TK=30 seconds minimum. This is especially necessary in regulator circuits where the plate of the amplifier tube ties back to the plate side of the passing tube. In such a circuit, during warmup, the grid bias may swing highly positive causing the cathode to lose its ability to sustain current.

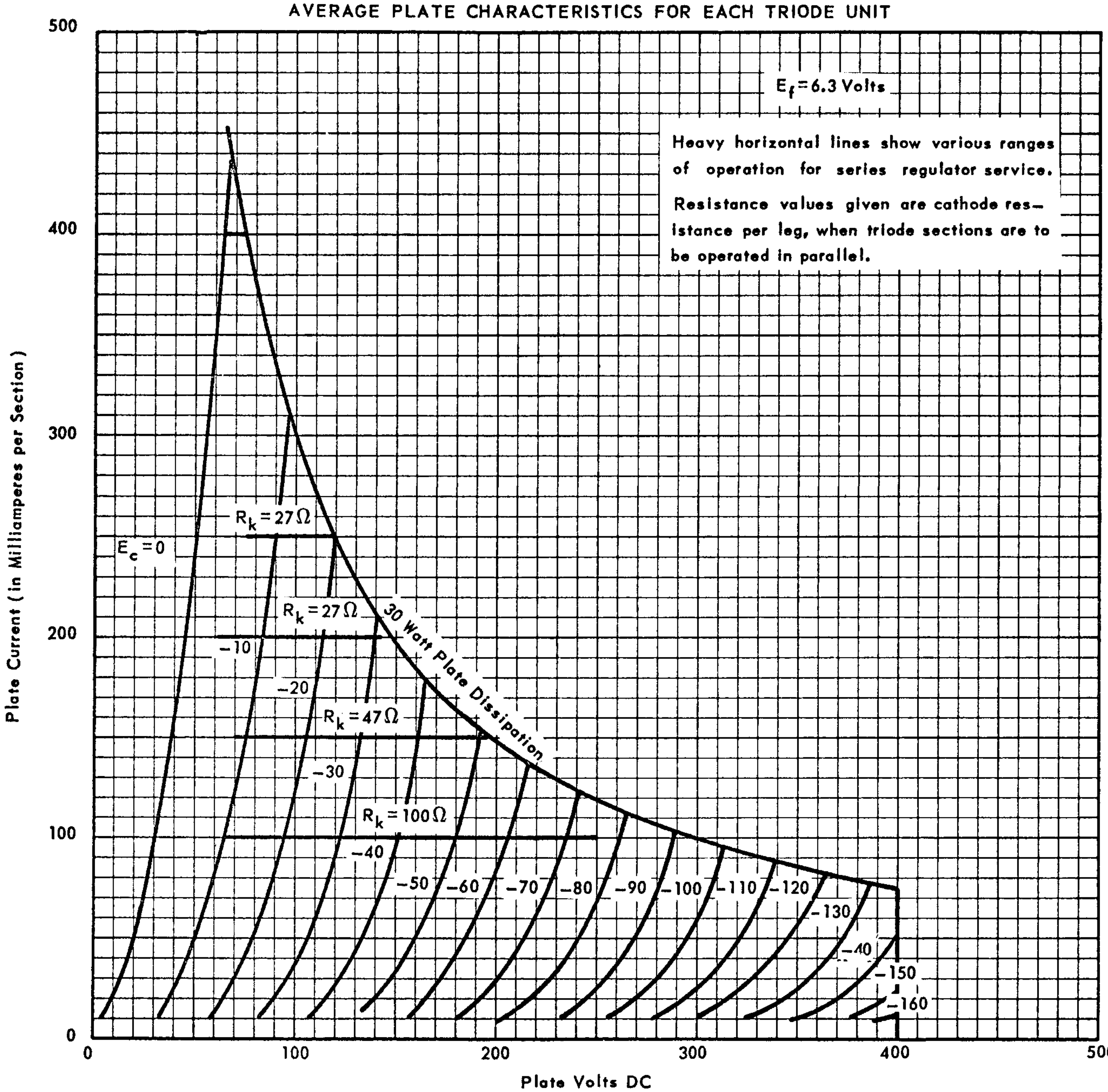
Note 15: Units shall be operated in parallel, with separate 200 ohm cathode resistors.

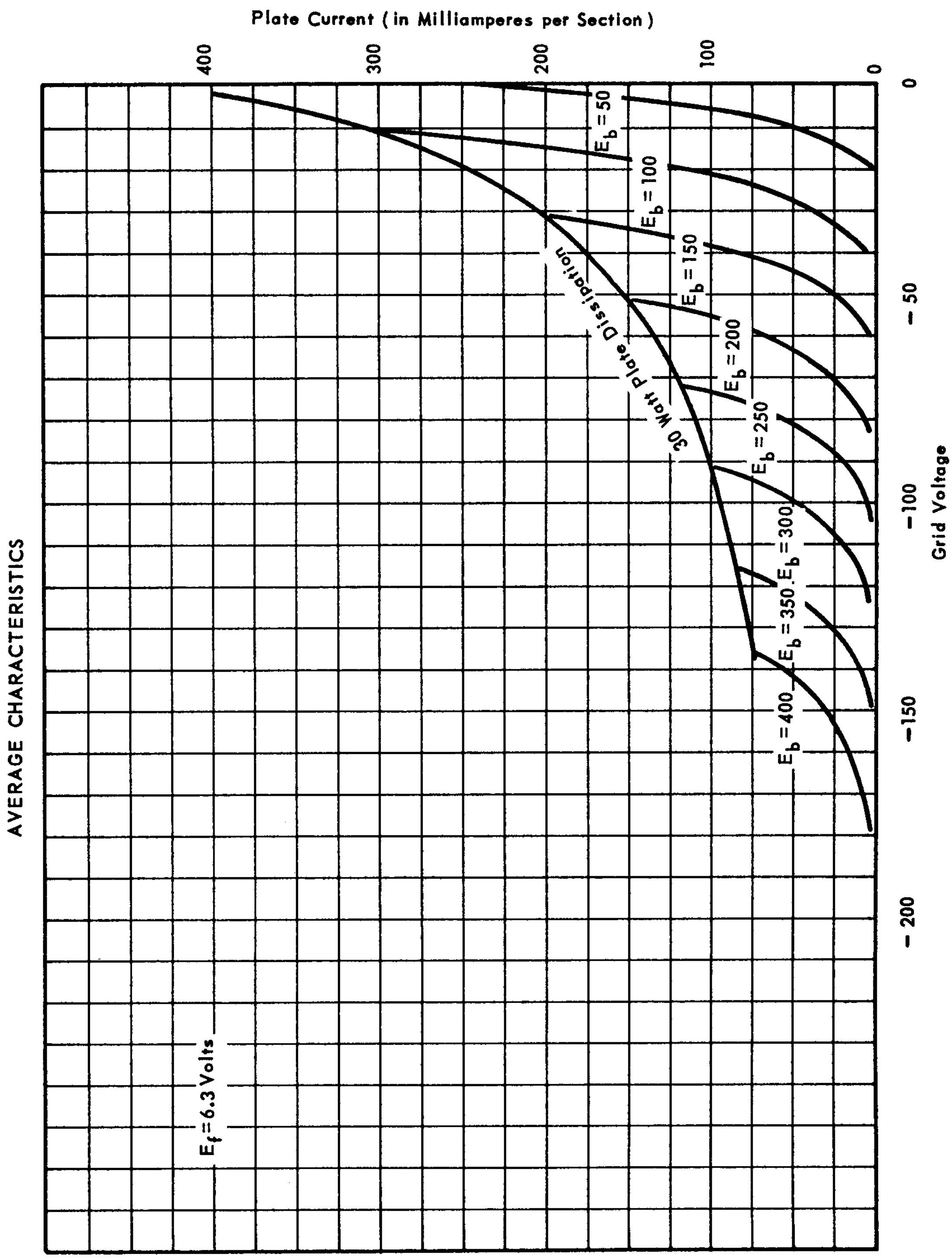
AVERAGE CHARACTERISTICS



TWIN POWER TRIODE

AVERAGE PLATE CHARACTERISTICS FOR EACH TRIODE UNIT




AVERAGE CHARACTERISTICS
Plate Current (in Milliamperes per Section)
400
300
200
100
0
Grid Voltage
0
−50
−100
−150
−200
$E_b = 50$
$E_b = 100$
$E_b = 150$
$E_b = 200$
$E_b = 250$
$E_b = 300$
$E_b = 350$
$E_b = 400$
30 Watt Plate Dissipation
$E_f = 6.3$ Volts